

University of Dundee

Optimizing photodynamic therapy regimens

Ibbotson, S.

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Title: Optimising PDT regimes: variables in irradiation may influence outcomes

Author: Professor Sally Ibbotson, Photobiology Unit, Dermatology Department, University of Dundee, Ninewells Hospital & Medical School, Dundee, DD1 9SY; Tel: 01382 383499; email: s.h.ibbotson@dundee.ac.uk

Topical photodynamic therapy (PDT) is widely accepted as an effective treatment for superficial basal cell carcinoma (sBCC). As with other non-surgical approaches, clearance and recurrence rates are higher following PDT than definitive surgical excision, with overall clearance at one year of approximately 76% being expected¹. For many patients this is a very suitable treatment approach, particularly if lesions are large and/or multiple or the patient is not suitable for surgery because of co-morbidities. However, optimising PDT outcomes through exploration of variables in treatment parameters, such as drug and light delivery is a priority.

Kessels and colleagues, report on a randomised controlled trial in which topical aminolaevulinic acid (ALA) PDT using a fractionated irradiation regime with a 2-hour dark interval delivered on one day was compared with conventional methyl aminolevulinate (MAL) PDT given as two treatments one week apart for sBCC². This research group has previously undertaken pre-clinical and clinical studies, indicating that high clearance rates can be achieved using this fractionated ALA PDT regime³. The two-fold irradiation process resulted in superior clearance rates of sBCC compared with a single continuous irradiation when followed up to 5 years after treatment⁴, supporting previous pre-clinical study observations^{4,5}. The hypothesis is that increased efficiency of PDT may be achieved due to optimising reoxygenation during the dark interval and through an enhanced immune response⁴.

In the current study, whilst there was a suggestion of higher clearance rates of sBCC one year after the fractionated ALA PDT regime compared with the MAL PDT regime, this was a non-significant result possibly due to the sample size and power of the study. Indeed, the fractionated ALA PDT regime resulted in greater side effects, notably pain. The study arms had several variables of prodrugs, application time of prodrugs, light sources and irradiation regimes. Therefore, given also that the differences in efficacy were non-significant, it is difficult to draw firm conclusions regarding the actual impact of the fractionation of irradiation per se.

The study was well undertaken in robust format and building on the authors track record from earlier studies, together indicates that a fractionated ALA PDT regime undertaken within the same day is an option for effective treatment of sBCC, although patients need to be advised of the risk of higher pain levels. It would be most interesting to compare ALA PDT with MAL PDT both with fractionated irradiation as the only variable in a larger sample size.

This is an important contribution to the literature as it highlights that there may be many ways to optimally deliver effective PDT. Clinic arrangements and patient preference regarding acceptance of risk of discomfort with treatment and whether it is preferred to have treatment all in one longer day or to return for a second treatment at one week are factors to take into account. Whilst effective, we cannot conclusively say that there is a conferred advantage of a fractionated regime for effective clearance of sBCC and it may be at the trade-off of increased side effects but having options regarding how to deliver effective PDT is key and this certainly warrants further study.

References

- 1 Roozeboom MH, Arits AHM, Nelemans PJ *et al.* Overall treatment success after treatment of primary superficial basal cell carcinoma: a systematic review and meta-analysis of randomized and nonrandomized trials. *Br J Dermatol* 2012; **167**: 733-56.
- 2 Kessels JPHM, Kreukels H, Nelemans PJ *et al.* Treatment of superficial basal cell carcinoma by topical photodynamic therapy with fractionated 5-aminolevulinic acid 20% versus two stage topical methylaminolevulinic acid: results of a randomized controlled trial. *Br J Dermatol*: in press.
- 3 de Haas ERM, Kruijt B, Sterenborg HJCM *et al.* Fractionated illumination significantly improves the response of superficial basal cell carcinoma to aminolevulinic acid photodynamic therapy. *J Invest Dermatol.* 2006; **126**: 2679-86.
- 4 de Vijlder HC, Sterenborg HJCM, Neumann HAM *et al.* Light fractionation significantly improves the response of superficial basal cell carcinoma to aminolaevulinic acid photodynamic therapy: five-year follow-up of a randomized, prospective trial. *Acta Derm. Venereol.* 2012; **92**: 641-7.
- 5 Robinson DJ, de Bruijn HS, de Wolf WJ *et al.* Topical 5-aminolevulinic acid-photodynamic therapy of hairless mouse skin using two-fold illumination schemes: PpIX fluorescence kinetics, photobleaching and biological effect. *Photochem. Photobiol.* 2000; **72**: 794-802.